MEMORIAL

OF

F. A. CHEVALIER DE GERSTNER,

PRAYING

To be allowed a copyright for his publications in this country for a period of five years.

DECEMBER 31, 1839.

Referred to the Committee on Patents and the Patent Office, and ordered to be printed.

To the honorable the Senate and the House of Representatives assembled in Congress:

The undersigned takes the liberty to inform your honorable body, that he arrived on the 15th of November, 1838, in the United States, for the purpose of collecting information on the internal improvements, viz: canals, railroads, and steam navigation in this country, and to publish on his return to Europe a large work on these subjects. The annexed memoir, published in Cincinnati on the 25th of June, 1839, gives a brief sketch of the researches made up to that time, and since then the undersigned has continued his travels in the United States.

The results gained by twelve months of laborious efforts, prove, that in the United States more has been done, and the public works have been better managed, than is the case with most of the works in the old world; and the undersigned is therefore of opinion, that a large book, published by a foreigner, containing descriptions and detailed data of all railroads, canals, and other improvements in this country, while it would make these works better and more generally known, to the great advantage of the United States, would tend to advance the cause of internal improvements both here and in Europe.

Penetrated with these sentiments, the undersigned wishes to publish this work during his intended stay in this country of a few years more, and therefore he prays your honorable body to grant him, by a special act of Congress, *a copyright for all his publications in this country during five years, beginning from the date of the act.*

F. A. CHEVALIER DE GERSTNER.

Member of the States in the Kingdom of Bohemia, late Professor of Mathematics in the Polytechnical School in Vienna, &c.

Philadelphia, Nov. 25, 1839.

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Railroads in the kingdom of Belgium compared with those in the United States.

The rapid increase of internal improvements in the United States has excited for several years public attention in Europe, and the friends of those improvements desired very much a detailed report on the extent and progress of those works, and particularly of *railroads*. There is no such report published in the United States, and even those published in England, France, and Germany, are very imperfect.

In 1824 I had charge of the first railroad on the continent of Europe, to connect the rivers Moldau and Danube in Austria, by a line which is 130 miles long, and since 1832 in operation. I constructed in 1836 and 1837 the first railroad in Russia, from St. Petersburg to Zarskoe-Selo and Pawlowsk, a line of only 17 miles in length, but the commencement of a railroad of 420 miles from St. Petersburg to Moscow. This railroad being likewise in full operation, I left Europe last fall and arrived in the Great Western on the 15th of November, 1838, at New York. After a short stay of a few days I went to Albany and inspected all railroads between that place and Lake Erie; I then proceeded to the eastern States and visited all railroads in Massachusetts, and went via New York, Philadelphia, Baltimore, Washington, through Virginia, North and South Carolina, Georgia, and Alabama, to New Orleans, always visiting the railroad lines in the different States. I went then up the Mississippi and Ohio, and am now inspecting the internal improvements of the western States and some of those in Pennsylvania, which I have not yet seen.

I have already passed over more than 2000 miles of railroads, and have everywhere been received with the greatest kindness; the presidents, directors and engineers of the different railroad lines gave me not only all their printed reports, but laid before me, with the greatest liberality, their books and accounts, in order to give me every kind of information. I fulfil only my duty when I publicly acknowledge, that such a liberality is only to be found among a free and enlightened people, where all public works are based on the principle of publicity, and where secrets do not exist. I wish, therefore, to make those gentlemen to whom I am so much indebted, another communication, which will show at the same time what has been done during the last years in Europe. Having within a few days received the last reports of the Belgian railroads, I publish in the following abstract the history and progress of those communications in Belgium, together with a comparison of them with the American railroads.

According to the facts collected during my travels since my arrival in New York, there are now *over three thousand miles of railroads completed and in operation in the United States;* 425 locomotives, of which the greatest number were made in this country, run on the several railroads, and I believe, that up to the end of 1839, the length of railroads in the United States may amount to 4,100 miles. The capital expended on the railroads now in operation is about sixty millions of dollars, or at an average cost of twenty thousand dollars per mile, for which sum the railroads, with the buildings, have been constructed, and the necessary locomotives and cars bought.

Several railroads have been undertaken with insufficient means, and the shareholders found themselves under the necessity of employing the income of the first years in improving the railroad, in building engine houses, &c., and purchasing locomotives and cars. In consequence of

this, the shareholders got during that time no dividends, but the railroad still yielded a good income. Other railroads, when finished, paid from five to ten per cent. income to the stockholders; others have not yet paid any dividends for want of a sufficient number of passengers and freight. The *average result* of the railroads now in operation in the United States, is, *that they give a yearly interest of five and a half per cent. on the capital invested.* This result must be regarded as very satisfactory, because the greatest part of the lines have only been a few years in operation.

On all lines there is a yearly increase of at least 15 to 20 per cent. in the gross income, so that even those lines which do not pay now will give in a few years a handsome dividend. According to these statements, based on the communications collected in this country, I have no doubt, that the large capital invested in railroads, in the United States, will not only produce an incalculable benefit to the country, but likewise pay the shareholders a dividend, which under good management, by the constant progress in population and trade, must likewise from year to year increase.

A good bookkeeping and clear accounts is in every business a matter of importance; railroads are new constructions, and experience, particularly in working them, is still very much wanted. When the superintendent of a railroad in operation keeps clear and distinct accounts, he will in a few years learn by experience what can be improved, and which items of expenses can be reduced. The following statement contains a manner of making the railroad accounts, which in my opinion must prove very useful for every railroad company.

I. HISTORY, LENGTH AND COST OF CONSTRUCTION OF THE BELGIAN RAILROADS.

The railroads, which up to the present time have been constructed in England and on the continent of Europe, had no other object than to connect two important places of the country, and in constructing them, therefore, only a local interest more or less prevailed. That railroads are to be considered *as great thoroughfares*, that they can form in a country the principal lines of internal communication—that, therefore, the means for their establishment should be such, as only can be raised by a whole nation, nobody in Europe would maintain previous to the year 1834, and is even now denied by many individuals of high standing and influence. Belgium, united with Holland since 1815, had distinguished itself in Europe, by its fine roads, and magnificent canals; the latter, being constructed for the greatest part in a level country; and without locks, were used not only for the transportation of goods, but also for passengers, especially the lower classes, which there, more than in any other country, made use of the canal boats for their travels. It is evident, that no individuals would ever have attempted to construct railroads parallel and in opposition to such canals and turnpike roads.

In the year 1830, Belgium declared itself independent of Holland, and elected by the representatives of the nation its own sovereign. King Leopold I. soon discovered, that the country, for its perfect tranquillity, wants "labor;" a series of wise legislation encouraged the nation to useful and profitable enterprises, and every person with talent and inclination found employment and earnings in a country, which isolated from all its neighbors, was confined to its own resources. But to gain the public opinion, a great national work was to be accomplished by the new government, able to fill posterity with admiration. The time was past for

Egyptian pyramids, for Roman triumphal arches, and French monuments of war. A more useful monument, one of peace and intelligence, should remind the nation of that eventful period. The king ordered the whole country to be surveyed by able engineers, the necessary plans and estimates formed, and on the first of May, 1834, a law was proclaimed, according to which *a system of railroads should be introduced through the whole kingdom, and executed at the expense of the State ;* on two points (at Antwerp and Ostend) the railroads were to lead to the seaports, on two points to connect with France, and on one point with Prussia (Germany).

The news of the gigantic work, undertaken by a State, even not yet acknowledged as such by the northern powers, and with only four millions of inhabitants, excited the greatest surprise in Europe, and few only could conceive the great results, which this grand project must necessarily produce *on the independence of the nation and its internal welfare*, its commerce and industry ; the former being the principal aim and the promotion of commerce and industry a subordinate one, although the great mass of the people were unable to comprehend the grand idea of the plan.

King Leopold found in his former minister of public works, Mr. De Theux, and in his successor, Mr. Nothomb, vigorous supporters. The engineers were vying in the swift prosecution of the work, and in the course of four years, more has been done than was expected. The enlightened minister, Nothomb, published annual reports to the legislative assembly, besides other special reports of the progress of the works, in which the public in Europe find a rich source of experience, not to be met with in any report or work on the subject. Europe has to render thanks to the king, who the first realized such a grand idea, and to his enlightened minister, who judiciously conducted the work, and so liberally communicated its results.

The limited space of this report does not allow a detailed extract from the above mentioned reports of the minister, Nothomb, and the engineers, I shall therefore only give a brief account containing the results in numbers, and afterward compare these results with those of railroads in the United States. The following table contains the sections of the railroads which were opened until the end of 1838, and their lengths in mètres and English miles :

Section of railroad.		Time of opening.	Length.	
From.	To.		In French mètres.	In English miles.
Brussels -	Malines -	May 5, 1835 - -	20,300	12.6
Malines -	Antwerp -	May 3, 1836 - -	23,500	14.6
Malines -	Termonde -	January 2, 1837 - -	26,700	16.5
Malines -	Louvain -	September 10, 1837 -	23,750	14.7
Louvain -	Tirlemont -	September 22, 1837 -	17,750	11.0
Termonde -	Gent -	September 28, 1837 -	30,500	18.9
Tirlemont -	Waremme -	April 2, 1838 - -	27,200	16.8
Waremme -	Ans -	April 2, 1838 - -	18,900	11.7
Gent -	Bruges -	August 12, 1838 - -	44,500	27.6
Bruges -	Ostend -	August 28, 1838 - -	23,500	14.6
		Total - -	256,600	159.0

According to the report, made by the minister to the house of representatives, on the 26th November, 1838, the above ten sections including buildings, locomotives and cars, cost 34,000,000 francs; this gives per mile of road, 41,300 dollars. The railroad from Brussels to Antwerp, 27.2 miles, has a double track, the remainder are constructed only with a single track, the rails weighing 45 lbs. per yard. But there are several buildings yet to be erected, and different works on the line to be executed, and besides a number of freight cars to be provided for, &c.; with all this, the cost per mile will amount to 45,000 dollars.

II. TARIFF FOR PASSENGERS—SPEED.

There are on the Belgian railroads four classes of passenger cars, differing only in elegance and comfort, but going in the same train, and therefore with equal velocity. The prices are:

In the Berlines,	$2\frac{1}{2}$ cents per mile,		For each passenger with 44 lbs. of baggage.
" Diligences,	2	"	
" Chars à Bancs,	$1\frac{1}{2}$	"	
" Wagons,	0.8	"	

The trains perform at an average 17 English miles per hour, all stoppages included, or from 20 to 25 miles while running.

III. TRAFFIC AND REVENUE OF THE BELGIAN RAILROADS.

The railroads in Belgium are frequented by more passengers than any other railroads; the transportation of freight was only begun between Brussels and Antwerp, in 1838. The following table shows the travel since the opening of the first section, until the 31st of October, 1838:

Period.	Total number of passengers.	Average distance performed by each passenger.	Number of passengers reduced for one mile.	Gross income.		
				From all passengers.		Passenger per mile.
		Miles.		Francs.	Dollars.	Amer. cts.
From May 5, 1835, to May 2, 1836	563,201	11.6	6,536,754	359,394	67,429	1.03
From May 3, to Dec. 31, 1836	729,545	20.2	14,718,709	734,736	137,849	0.90
In the year 1837	1,384,577	17.2	23,838,436	1,416,983	265,850	1.11
From Jan. 1, to Oct. 31, 1838	1,921,619	22.8	43,887,864	2,589,384	485,813	1.11
In 3 years and 6 months	4,598,942	19.35	88,981,763	5,100,497	956,941	1.07

to which must be added 44,148 francs, or 8,281 dollars, as the gross income from freight in the year 1838.

In the year 1837 there were 30,857 soldiers under the number of passengers, for whom, in consequence of an arrangement with the ministry of the war department, only half price was paid.

In 1838, the total number of passengers amounted, according to the "Moniteur Belge," to 2,238,303, comprising 56,648 soldiers, and the gross income was 3,100,833 francs 40 centimes (581,770 dollars). As the average distance performed by each passenger in the first 10 months of

1838 is not mentioned in the report of the minister, I supposed the income per passenger per mile to be the same as in 1837, out of which results an average distance of 22.8 miles. In order to show how the travelling public made use of the different classes of cars, the following contains the number of passengers in each class of cars, and the revenue resulting therefrom for the year ending 31st December, 1838. During this period there were

17,503	passengers	I. class, who paid	69,322 francs 65 centimes.
215,893	do.	II. class, "	702,502 francs 70 centimes.
604,935	do.	III. class, "	1,033,953 francs 05 centimes.
1,343,354	do.	IV. class, "	1,087,790 francs 45 centimes.
56,618	soldiers,	"	45,248 francs 88 centimes.
		For overweight of bag'e and freight,	162,015 francs 67 centimes.
2,238,303	passengers,	and total income,	3,100,833 francs 40 centimes.

These numbers explain sufficiently that the railroads in Belgium are used principally by the lower classes of the people.

IV. COST OF WORKING THE BELGIAN RAILROADS.

The accounts kept under this head contain an exact subdivision of the different expenses occurring in working the railroads; the first general subdivision contains *the maintenance of way and police;* the second, *the cost of transportation*, viz, fuel, engineers and firemen, repairs of locomotives and cars, grease for the same, also the expenses for conductors, carriers and baggage men; the third embraces *the general expenses*, viz, clerks and ticket sellers, comptrollers, printing, advertising, office expenses, &c. The annexed table contains the expenses under the different heads:

Period.	Maintenance of way and police.	Transportation account.	General expenses.	Total.	
	Francs.	Francs.	Francs.	Francs.	Dollars.
From May 5, to Dec. 31, 1835 - -	50,584 01	105,967 88	12,220 84	168,772 73	31,665
Year 1836 - -	132,637 41	261,778 30	36,719 96	431,135 67	80,888
Year 1837 - -	345,824 53	664,940 46	144,706 92	1,155,471 91	216,786
From Jan. 1, to Oct. 31, 1838 - -	377,822 58	1,059,180 71	182,186 48	1,619,189 77	303,788
In 3 years and 6 months	906,868 53	2,091,867 35	375,834 20	3,374,570 08	633,127
	or 27 per ct.	or 62 per ct.	or 11 per ct.	or 100 per ct.	

As this table contains the expenses of working the railroads $3\frac{1}{2}$ years, these numbers may certainly be regarded as the result of a great experience.

V. COST OF REPAIRS OF LOCOMOTIVES AND CARS.

In the last table the sum of 1,059,180 francs 71 centimes appears under the head of transportation account for ten months in 1838. This sum

contains the expenses for foremen in the shops,	32,177f. 54c.
For laborers,	187,463f. 61c.
At the principal shops in Malines,	54,868f. 72c.
For materials for repairs,	87,965f. 66c.
Total,	362,475f. 53c.

or 68,006 dollars, which is 34 per cent. of the expenses of transportation. I believe that the expenses for repairs of engines and cars might be diminished by the introduction of locomotives with moveable trucks in front, and of eight-wheeled passenger and freight cars.

VI. EXPENSES PER PASSENGER PER MILE.

The accurate number of miles performed by passengers not being contained in the last report, the expenses per passenger per mile can only be found up to the end of 1837. According to the last statement, the expenses from the 5th of May, 1835, to the 31st of December, 1837, were:

For maintenance of way,	529,045f. 95c.
Transportation account,	1,032,686f. 64c.
General expenses,	193,647f. 72c.
Total,	1,755,380f. 31c.

During the same period the number of passengers reduced to 1 mile was equal to 45,093,899, which divided in the above gives as the expenses per passenger per mile,

For maintenance of way,	1.17 centimes, or 0.22 cents.
Transportation account,	2.29 centimes, or 0.43 cents.
General expenses,	0.43 centimes, or 0.08 cents.
Total,	3.89 centimes, or 0.73 cents.

These expenses are very low, and are exceeded on every other railroad.

VII. EXPENSES PER MILE OF TRAVEL.

The number of miles performed by all the locomotives with their trains was:

From 5th May, 1835, to 2d May, 1836,	14,810 lieues.
From 3d May, 1836, to 31st December, 1836,	24,825 lieues.
From 1st January, 1837, to 31st December, 1837,	61,592 lieues.
Total,	101,227 lieues.

at 5000 mètres, or 314,506 English miles; the expenses during the same period of 2 years and 8 months were

For maintenance of way,	529,045f. 95c.	therefore per mile of travel,	1f. 68c. or 31½ cents
For transportation account,	1,032,686f. 64c.	" " "	3f. 28c. or 61½ cents.
General expenses,	193,647f. 72c.	" " "	0f. 62c. or 12 cents.
Total,	1,755,380f. 31c.		5f. 58c. or 105 cents.

The expenses for every mile which a locomotive with its train runs, amount therefore to 5 francs 58 centimes, or 1 dollar 5 cents, being very near the same as on the American railroads.

VIII. NUMBER OF PASSENGERS PER TRIP.

In the table under No. 3, we have shown that the number of passengers from the 5th of May, 1835, to the 31st of December, 1837, reduced for the length of a single mile of road, amount to 45,093,899; during the same period the trains performed 314,506 miles; this gives 143 as the average number of passengers in a train. This number compared with 5f. 58c. as the expenses per mile of travel, gives again 3.89c. or 0.73 cents as the expense per passenger per mile.

IX. COMPARISON BETWEEN THE GROSS INCOME AND THE NET REVENUE.

The following table contains the annual gross income, current expenses, and the surplus of income over the expenses, as is related in the report of the minister of the 26th of November, 1838, to which is annexed the annual surplus for every 100 francs of the gross income:

Period.	Total gross income.	Current expenses.	Surplus of the revenue over the expenses.	From 100f. of the gross income remained after defraying all expenses.
	Francs.	Francs.	Francs.	Francs.
May 5, 1835, to Dec. 31, 1835 - - -	268,997 50	168,772 73	100,224 77	37 26
Year 1836 - - -	825,132 85	431,135 67	393,997 18	47 75
Year 1837 - - -	1,416,982 94	1,155,471 91	261,511 03	18 46
Jan. 1, 1838, to Dec. 31, 1838 - - -	2,633,532 21	1,619,189 77	1,014,342 44	38 52
Total - -	5,144,645 50	3,374,570 08	1,770,075 42	34 41

As an average, therefore, of 3½ years, of every 100 francs revenue, only 34 francs 41 centimes remained, but as all the locomotives and cars are still new, and no amount for general depreciation appears under the expenses, it is to be supposed, that in future only 30 francs will remain from 100. This surplus serves as interest and a sinking fund for the capital.

X. GROSS INCOME PER MILE OF RAILROAD.

The public in Europe is almost throughout of opinion, that only short lines, and these especially between two populous cities, will pay a good interest, but the branch roads extending to remote, less populated parts of a country will never yield any profits. What results the Belgian roads give in that respect, the annexed table will show:

Period.	Number of sections opened.	Average length of road in operation.	Gross income during the whole period.	Annual income per single mile of road.	
			Francs.	Francs.	Dollars.
May 5, to December 31, 1835 -	1	12.6	268,997 50	32,333 75	6,066
Year 1836 - - -	2	22.3	852,132 85	38,212 23	7,169
Year 1837 - - -	6	56.1	1,416,982 94	25,258 16	4,739
January 1, to October 31, 1838 -	10	118.7	2,633,532 21	26,638 34	4,998
Total - - -	-	53.1	5,144,645 50	27,735 98	5,204

In the second column appears for the year 1835, only the section between Brussels and Malines of 12.6 miles, opened at that time. In the year 1836, these 12.6 miles were in operation for 365 days, and the second section from Malines to Antwerp, of 14.6 miles, for 243 days only. In multiplying the length of each section by the respective numbers of days, and dividing the sum by 365, we receive 22.3 miles as the average length in operation during the whole year 1836. In the same manner the average length was obtained for the years 1837 and 1838. The last column shows, that the annual receipt per single mile of road amounted in the first year, when the novelty attracted many passengers, and only 12.6 miles were opened, to 32,333 francs 75 centimes, and that in the 3d and 4th years, when curiosity attracted but few, and the greatest number travelled for business only, and while a much greater length of road was in operation, these receipts amounted still to 26,500 francs per mile yearly. This amount will undoubtedly be increased in the following years, as in 1838 four new sections came in operation, on which the traffic will develop itself only by-and-by; besides, there will be the transportation of goods, which for the year 1839, is estimated to give a revenue of 850,000 francs for 159 miles, or 5,346 francs per mile; the gross income on the Belgian railroads will, therefore, also in future, like the first year, amount to about 32,000 francs per mile of road annually. That, by the increase of population and commerce, also, this income of 32,000 francs will be increased, is evident; the railroads in Belgium serve, therefore, as a proof, that long lines of railroads may (some extraordinary circumstances excepted) be executed with equal success as short ones.

It would be quite erroneous in calculating the revenue of a system of railroads, canals, or turnpike roads, to regard the income on the principal line separately, and so the revenue of each of the branch lines, in order to judge of the value of each of them. By the opening of a branch line the income of the main line must become greater; because the passengers and freight from the branch lines will pass over the same and increase the revenue. The accurate way of calculating a whole system of railroads, canals, or turnpike roads, must therefore be to compare the *total income of the main line as well as of the branch lines*, with the *total length of all the lines*, in order to find the *average income per mile;* and in deducting therefrom the expenses, the balance will show, when compared with the cost of construction per mile, what interest ensues for the capital invested.

XI. BUDGET FOR THE OPERATIONS OF THE BELGIAN RAILROADS IN THE YEAR 1839.

We have seen that the annual gross income will amount to 32,000 francs per mile, therefore for the 159 miles which are in operation, to 5,088,000 francs. After defraying all the expenses, from 100 francs gross receipts, there remain 34 francs 41 centimes; the net income will, therefore, be 1,750,780 francs, instead of which the minister, in his budget, anticipates the amount at 1,700,000, to which he is led by a different calculation. This surplus is exactly 5 per cent. of the capital expended of 34,000,000 francs. These 5 per cent. suffice for interest and sinking fund, and therefore the Belgian railroads fulfil their object, to maintain themselves without being a charge to the state treasury.

XII. INCREASE OF INCOME FROM THE MAIL AND TURNPIKES.

As an objection against railroads, it was further maintained, that their introduction into a country will lessen considerably the receipts of tolls on turnpike roads and of the mail, because there will be less travel on turnpike roads, and letters will be carried by persons who travel on railroads; the same opinion appears to have existed in Belgium. On the 27th of January, 1838, the minister, Mr. Nothomb, declared in the senate, that the revenue of the mail in 1837 exceeded that of 1836 by 262,373 francs, and the tolls on turnpike roads by 110,000 francs, for the reason that although the tolls on those roads which go in a parallel direction with railroads are lessened, yet they are increased in a greater proportion on those turnpike roads which lead to the railroads, as they are passed over by all who come to travel on the latter. The revenue from the mail increased in consequence of the greater intercourse occasioned by the introduction of railroads.

XIII. COMPARISON OF THE BELGIAN RAILROADS WITH THOSE IN THE UNITED STATES.

According to the table under No. 3, the number of passengers during 3½ years, reduced for the length of one mile, amounted on the Belgian railroads to 88,981,763, or at an average per year of 25,423,361. As the average length of road in operation during the whole time was 53.1 miles, we have 478,783 through passengers annually. The *Belgian railroads are therefore travelled over on their whole length by nearly* 500,000 *passengers per year.* We have now the following comparison:

(*a.*) *Cost of construction.*—A mile of railroad with a single track, and the necessary buildings and outfit, costs in America 20,000 dollars; in Belgium, 41,300 dollars, or more than twice the amount.

(*b.*) *Tariff.*—On the American railroads, a passenger pays at an average 5 cents per mile; on the Belgian railroads, only 1 cent, or five times less; for freight the charge is, in America, at an average 7½ cents per ton per mile.

(*c.*) *Speed.*—On the American railroads, passengers are conveyed with a speed of from 12 to 15 miles per hour, stoppages included: on the Belgian roads at the rate of 17 miles, or stoppages not included, at the rate of from 20 to 25 miles.

(*d.*) *Traffic.*—There are at an average, 35,000 through passengers, and 15,000 tons of goods carried annually over the American roads; on the Belgian there have been carried per year 478,783 through passengers, and the transportation of goods only commenced a short time since.

e. Gross income.—The same amounts on the American railroads, at an average per mile and per year,

From 35,000 passengers at 5 cents,	1,750 dollars.
From 15,000 tons of goods at 7½ cents,	1,125 dollars.
From mail and contingencies,	200 dollars.
Total,	3,075 dollars.

On the Belgian railroads the gross income per mile from 478,783 passengers, and the transportation of freight amounts to 32,000 francs, or 6,003 dollars 75 cents per year.

(*f.*) *Expenses per mile of travel.*—These amount on the American railroads to 1 dollar, on the Belgian roads to 1 dollar 5 cents, or they are the same in both countries.

(*g.*) *Number of passengers per trip.*—In Belgium there were in each train, at an average of 3½ years 143 through passengers; on the American roads, a passenger train contains only 40 through passengers, at an average.

(*h.*) *Number of trips per year.*—In dividing 35,000 by 40 we obtain 875, as the average number of passenger trips per year on the American railroads; and in dividing 478,783 by 143 we get 3,348, which represents the average number of passenger trains passing annually over the Belgian roads. As at the same time the speed on the latter is greater than on the American railroads, it was necessary to employ rails of 45 lbs. per yard, while their weight is generally less on the American railroads.

(*i.*) *Expenses per passenger per mile.*—These are in Belgium only 0.73 cents, and in America 2½ cents, or 3½ times more. The reason of it is, that the American trains contain 3½ times less passengers, while the expenses per train per mile are equal in both countries. It is very nearly the same for a locomotive to carry 40 or 143 passengers in a train.

(*k.*) *Annual current expenses.*—In America the annual current expenses for working a railroad, are per mile,

For transportation of 35,000 passengers, at 2½ cents,	875 dollars.
For transportation of 15,000 tons of goods at 6½ cents,	975 dollars.
For transportation of the mail and other expenses,	100 dollars.
Total,	1,950 dollars.

Or 63 dollars 41 cents of every 100 dollars gross income. On the Belgian railroads, of every 100 dollars gross revenue, the expenses are 65 dollars 59 cents, or per year per mile 3,937 dollars 86 cents.

(*l.*) *Interest on the capital invested.*—In America, the annual average gross income, per mile of road, amounts to 3,075 dollars, the annual current expenses to 1,950, leaving 1,125 dollars, which compared with the cost of a mile of road (20,000 dollars) give 5½ per cent. interest. On the railroads in Belgium, the annual gross income per mile, is 6,003 dollars 75 cents, the expenses 3,937 dollars 86 cents, leaving 2,065 dollars 89 cents as interest on the cost of 41,300 dollars per mile, or exactly 5 per cent.

XIV. GENERAL REMARKS.

The comparison of the results of the Belgian railroads with those of the railroads in the United States of America, speaks evidently in favor of the first. The extremely low charges for passage on the Belgian railroads has increased the number of passengers in an unparalleled degree, and produced an intercourse not attained in any other country of the world. While the higher prices in the better classes of cars yield a considerable profit, the price in the last class, or for the great mass of the people, is so low, that it almost only covers the expenses. The Belgian railroads are, therefore, throughout, a great popular, democratic establishment, which must have found the approbation of the people and every intelligent man; the Belgian railroads afford to the government the greatest facility in the transportation of troops, the importance of which was evinced principally for the last years; the Belgian railroads yield, in conformity with the grand idea of their establishment, only the interest and sinking fund of their capital, but the state treasury has, by the increase of intercourse, indirectly gained in all taxes, in the revenue from tolls on turnpike roads, and from the mail; the most important gain, however, was that kept in view by the great founder of these roads, to bring the nation into a more intimate contact, and to form of it one large family, on which the actual national device: "L'Union fait la force," ("Union gives strength,") becomes realized.

F. A. CHEVALIER DE GERSTNER.

Cincinnati, June 25, 1839.

Letters addressed to the care of Messrs. Maitland, Kennedy & Co., New York.

N. B. Five francs and 33 centimes, or 533 French centimes, are equal to one dollar. One English mile is equal to 1,610 mètres.